

Overview of conditions seen on a Canadian Memorial Chiropractic College outreach to the Dominican Republic

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Objective: This study aims to gather information on conditions seen, treatments rendered, and referrals made during a Canadian Memorial Chiropractic College outreach to the Dominican Republic serving those in need.

Methods: Data was extracted from templated patient files retrospectively.

Results: Spinal, extremity and other/whole body chief complaints accounted for 71.79%, 24.64% and 3.57% respectively in patients ranging in age from 1.5 to 106 years whose data was collected. Mechanical pain accounted for 95.07% of all cervical, 96.81% of thoracic and 91.27% of lumbar spine diagnoses. Various non-mechanical conditions were also encountered.

Manual therapy was performed in 96.10% of cases. Twenty referrals were made to urgent care, six to a

Aperçu des conditions observées pendant une mission du Canadian Memorial Chiropractic College en République dominicaine.

Objectif : Cette étude vise à recueillir des données sur les conditions observées, les traitements administrés et les renvois effectués pendant la mission d'un établissement d'enseignement de la chiropratique en République dominicaine, au service des personnes dans le besoin.

Méthodologie : Les données ont été extraites de dossiers de patients.

Résultats : Les principaux symptômes des patients étaient des douleurs à la colonne vertébrale, aux extrémités et à toutes les parties du corps; elles étaient apparues respectivement chez 71,79 %, 24,64 % et 3,57 % des patients âgés de 1,5 à 106 ans. La douleur mécanique comptait pour 95,07 % de tous les symptômes cervicaux, 96,81 % des douleurs thoraciques et 91,27 % des douleurs lombaires. Divers troubles non mécaniques étaient aussi observés.

Des thérapies manuelles ont été pratiquées dans 96,1 % des cas. Vingt patients ont été orientés vers des

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World Spine Care clinic and 46 for further investigation, including local medical doctors or surgery.

Conclusion: This study reports empirical data collected from an 11-day outreach to the Dominican Republic that provided otherwise unattainable chiropractic care for musculoskeletal complaints.

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KEY WORDS: chiropractic, conditions, Dominican Republic, outreach, retrospective, short-term medical trips

Introduction

Chiropractic educational institution international outreach trips involving clinicians and interns/students have been carried out for many years. Although there is literature which lists such institutions and the countries that receive these outreach or mission trips¹, to this author's knowledge there has not been any chiropractic educational program that has published, in peer reviewed literature, details of their international outreach programs. Empirical evidence describing conditions seen on any short-term outreach trips is lacking.

Since 2008, Canadian Memorial Chiropractic College (CMCC) has organized annual student outreach trips to the Dominican Republic (DR). These trips address musculoskeletal (MSK) disorders through primary chiropractic care to people in underserved communities across this developing country which has a lack of easily attainable chiropractic care. Locations visited include local community centres, churches and public hospital settings within various cities and villages chosen ahead of time by a host medical doctor. The doctor has been involved with CMCC's outreaches since 2008 and is familiar with the location of underserved communities and their need for MSK/spinal care. The outreach is typically advertised in advance in each host location by local media, describing the event as a free mobile clinic for the treatment of problems with the spine, muscles and other joints of the body.

To narrow the gap in the literature concerning a lack

établissements de soins d'urgence; 6 vers une clinique World Spine Care et 46 vers des médecins de la région pour subir d'autres examens, ou une intervention chirurgicale.

Conclusion : Cette étude rend compte des données empiriques recueillies au cours d'une mission de 11 jours en République dominicaine au cours de laquelle des soins chiropratiques ont été offerts à des patients qui autrement n'auraient pas pu en bénéficier.

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MOTS CLÉS : chiropratique, conditions, République dominicaine, sensibilisation, rétrospective, voyages médicaux de courte durée

of research on empirical data from such international outreach programs, the objectives of this study are to gather information on what conditions were seen during CMCC's 11-day outreach in 2017 to the Dominican Republic. This information includes aggregated data on musculoskeletal and non-musculoskeletal conditions, as well as treatment rendered, including manual therapy, and, when necessary, referrals, such as for imaging, blood work, surgery or further investigation with an appropriate health care professional within the local health care system. This study may be useful for planning future trips by this or other similar institutions.

Methods

Outreach program clinical processes

In 2017 this outreach team to the DR was comprised of two clinicians, who were employed by CMCC to oversee interns in its clinics, and 12 chiropractic students enrolled at CMCC. The students were interns in the final stages of their internship year who had applied for and met pre-requisites for the outreach trip. Prerequisites for the 2017 outreach included having already met specific clinical requirements of their internship year and providing a letter of intent and letters of reference from inside and outside CMCC. The clinicians who attended the outreach with the interns were not involved in the selection of applicants.

The 2017 CMCC outreach team was supported locally by the bilingual host medical doctor, a nurse and several medical students. The latter served as translators in addition to other local translators.

A number of local volunteers assisted the team. All local volunteers were people who reside in the Dominican Republic. Intake volunteers largely only spoke Spanish. The local medical students and other translators were bilingual and served to help the interns and clinicians with the patient encounters.

For this outreach a standard template intake form was developed in advance in order to accumulate data on a consistent basis. Potential clinical impressions²(CI)/diagnoses commonly seen in a chiropractic setting, and typically seen in CMCC's own clinics, were listed together with tick boxes to allow for ease of data collection. Any CI/diagnoses not listed could be added in an "other" box. Additional notes could be written as necessary. This allowed for an efficient yet robust collection of data points for purposes of this study.

At each clinic location visited during the outreach, local Spanish-speaking volunteers called each person to sit at a table with them to fill out the first page of the clinical file which included an explanation of chiropractic. They were also informed that their file could be used for research in the future after the group's return to Canada. If the patient consented to this, a signature was obtained, and an identification number was placed on the consent form and also on the patient intake file pages. All but one individual agreed to allow their file to be used for research. That patient was examined and treated but their file was not analyzed subsequently. Ultimately 1123 patients were seen.

All patients who wanted a consultation and treatment sat with the local Spanish-speaking volunteers, who recorded their basic demographic information. The volunteers asked them, in Spanish, to answer the templated basic health history questions on the standard intake form. These included the chief complaint and secondary complaints, if applicable, together with a pain diagram, as well as previous surgeries, traumas and other red flags. The patients were also screened for any possible current active viral infections that may have needed them to be referred out for medical evaluation immediately (including fevers, skin rashes, and painful or red eyes). Various common comorbidities and health problems, as listed in the

intake form, were also specifically screened for. Further questions were asked, including whether they were aware of having had a mosquito borne viral infection in the past such as zika, chikungunya and dengue. All these items were recorded on the templated form written in Spanish that served as the first page of their clinical record and ensured that each patient was asked the same questions.

Each intern then called in a patient and took their height, weight and blood pressure. After reviewing the chart, interns performed a further history on primary and secondary complaints, using one of the local translators. With consent, an exam was performed, under the supervision of the two CMCC clinicians, and notes were recorded in the paper intake form. The intake form was structured in a template format allowing note takers to check off boxes for findings as well as for a variety of CI/diagnoses, and also to write out any additional notes as necessary. Once the clinicians approved of the examination and CI/diagnosis rendered by the intern, consent was obtained for treatment. Treatment was rendered as appropriate, including manual therapy as well as exercises and advice with the help of a translator. When a CI/diagnosis was rendered that required referral, urgent or otherwise, whether related to the presenting complaint or to a condition noticed by the intern/clinician based on the examination or health history, appropriate referrals were arranged immediately. The local medical students, host doctor and nurse, who formed part of our team, were called upon to secure and expedite any referrals made.

Patients were seen for a single visit, given the structure of this mobile clinic. In a very limited number of cases, an additional treatment may have been rendered the following day if necessary and if the next day's location was close by the previous one. In such cases, the patient was instructed to return to the same intern to avoid having to queue up again and refill paperwork.

Study methods

This was a retrospective chart review done on the records of people who attended the 2017 CMCC outreach to the Dominican Republic. Ethics approval for this study was obtained from the Office of Research Administration of CMCC, under Certificate No. 1702X03 and by the Dominican Republic Ethics Council CONABIOS under issued letter number 007-2017. Patient records were maintained in a de-identified format separate from the

signed consent forms. Files were housed in a locked storage area within the campus clinic of CMCC. All but one patient consented to the use of their data.

Data entry from the patient records was performed by a recent chiropractic graduate not involved in the outreach trip. The data entered was then reviewed by one of the outreach clinicians for input accuracy. Data from any clinic attendees who decided to leave prior to being seen by an intern for consultation were excluded from data entry and thus do not form part of the reported population.

The data entered included demographic information, such as age, sex, height and weight (reported as body mass index (BMI)) and occupation. It also included findings such as chief complaint, secondary complaint, comorbidities, review of systems, red flags, CI/diagnoses as listed in the file, treatment rendered, referrals made and previous infectious diseases. The CI/diagnoses related to conditions seen were then classified into mechanical or non-mechanical, for the various regions of the body, covering the spine and extremities. Mechanical low back pain or pain that some refer to as non-specific low back pain is defined as pain not caused by specific pathologies (e.g., fracture, dislocation, tumor, infection or systemic disease).^{3,4} This definition was used by this author to apply not only to CI/diagnoses related to the spine but to those of the extremities as well. In this study, radiculopathies with and without back pain were considered non-mechanical.

For neck pain, mechanical referred to Grades I and II as classified by Haldeman *et al.*⁵ Grade III neck pain was considered non-mechanical due to neurologic involvement. Where other nerve related disorders were seen, such as nerve entrapments or polyneuropathies for example, those were also considered non-mechanical.

The statistical analysis for this study was generated using SAS software v9.4. (Copyright © 2012-2018, SAS Institute Inc., Cary, NC, USA) SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. The analysis comprised mean and standard deviation (where applicable), for demographic data, and percentages for data collected on conditions seen.

Results

Demographic information related to the patients from this data set is provided in Table 1, reflecting a diverse range of age, sex and BMI characteristics for the population. Patients who attended had a mean age of 57 and included 39 patients under 20 years of age, and 91 patients over the age of 80. Two thirds were female, and the majority of patients were found to be in the overweight or obese categories of the BMI.

The full list of mechanical and non-mechanical conditions, by region of the body, that were templated on the 13-page intake form, can be found in Table 2. Of this

Table 1.
Basic descriptive information of the study sample.

Sex (N)	N	Male	%	Female	%	
	1121	375	33.45	746	66.55	
Age (Value)	N	Range	Minimum	Maximum	Mean	Std deviation
	1121	104.5	1.5	106	56.84	17.69
Age Distribution (N)	N	0 – 19	20 – 39	40 – 59	60 – 79	80 +
	1121	39	144	412	435	91
BMI (Value)	N		Minimum	Maximum	Mean	Std deviation
	1062		8.77	55.25	27.09	5.43
BMI Category (N)	N		0.0 – 18.5	18.5 – 25.0	25.0 – 30.0	30.0 +
	1062		37	353	400	272

N = Number of Values Captured (values below N=1122 reflect missing data points)

Table 2.

Clinical impressions/diagnoses templated and rendered, divided into mechanical and non-mechanical.

Mechanical		Non-Mechanical	
Templated potential diagnoses /clinical impressions	Suspected /rendered	Templated potential diagnoses /clinical impressions	Suspected /rendered
Cervical spine		Cervical spine	
Mechanical pain (facet and muscle) i.e. grade 1/2 NAD	✓	Spondyloarthropathy	✓
Strain/myofascial pain syndrome	✓	Radiculopathy i.e. Grade 3 NAD	✓
Sprain		CSM (Cervical Spondylotic Myelopathy)/ cord compression	✓
Congenital torticollis		Migraine headache	✓
Cervicogenic headache	✓		
Tension headache	✓		
TMJ dysfunction (including disc/myofascial origin)	✓		
Thoracic spine		Thoracic spine	
DDD/DJD	✓	Fracture	✓
Facet/Costovertebral Joint Dysfunction/sprain	✓	Spondyloarthropathy	
Discal Lesion		Radiculopathy	
Strain	✓	Viscerosomatic referral pain from gall bladder	✓
		Shingles	✓
		Kidney infection or stones	✓
Lumbar spine		Lumbar spine	
Discogenic non-radicular	✓	Spondyloarthropathy	✓
Myofascial pain syndrome	✓	Radiculopathy/nerve root impingement	✓
Mechanical LBP w/ facet	✓	Neurogenic claudication	✓
Thoracolumbar syndrome	✓		
Sacroiliac Syndrome/dysfunction	✓		
Foot/Ankle/Leg		Foot/Ankle/Leg	
Joint dysfunction	✓	Fracture	
Osteoarthritis	✓	Infection	✓
Plantar Fasciitis	✓	Neuropathy	✓
Sprain	✓	DVT/thrombophlebitis	✓
Synovial impingement		Rheumatoid arthritis	✓
Tendinopathy	✓		
Elbow/Wrist/Hand		Elbow/Wrist/Hand	
Osteoarthritis	✓	Fracture	✓
DeQuervain's tenosynovitis	✓	Infection	
Benign hypermobility syndrome		Rheumatoid arthritis	✓
Tendinopathy	✓	Carpal tunnel syndrome	✓
Medial / Lateral epicondylitis	✓	Radiculopathy	✓
Trigger finger	✓	Thoracic outlet syndrome	✓
Dupuytren's contracture	✓	Polyneuropathy	✓
Strain	✓		
Sprain	✓		
TFCC sprain			
Scapholunate instability			

Table 2. – Continued

Clinical impressions/diagnoses templated and rendered, divided into mechanical and non-mechanical.

Mechanical		Non-Mechanical	
Templated potential diagnoses /clinical impressions	Suspected /rendered	Templated potential diagnoses /clinical impressions	Suspected /rendered
Shoulder			
Impingement	✓		
Osteoarthritis	✓		
Instability/SLAP (labral)	✓		
Rotator cuff lesion	✓		
Adhesive capsulitis	✓		
Tendinopathy	✓		
AC Separation	✓		
Subacromial bursitis			
C/Spine referral			
Strain	✓		
Knee		Knee	
Internal derangement/meniscus	✓	Infection	
Osteoarthritis	✓	Rheumatoid arthritis	✓
Strain	✓		
Sprain	✓		
Tendinopathy	✓		
Patellofemoral pain syndrome	✓		
Plica irritation			
Hip		Hip	
Bursitis	✓	Legg-Calve-Perthes	
FAI	✓		
Tendinopathy	✓		
Labral tear			
Transient hip synovitis			
Slipped capital femoral epiphysis			
Osteoarthritis	✓		
Other *	✓	Other **	✓

Other* – includes joint dysfunction not templated and club foot

Other** – includes neurologic (post stroke paralysis/weakness, brain injury, other neurodegenerative diseases like Parkinson's), cerebral palsy, Bell's palsy, tumors, headache of unknown origin, whole body pain, dislocations, deformities, enlarged testicle, primary abdominal pain, leg/foot ulcers, venous disease, infection

LBP- low back pain; TFCC- triangular fibrocartilage complex ; FAI- Femoral Acetabular Impingement; NAD- Neck Pain Associated Disorder; DVT- deep vein thrombosis; SLAP- superior labrum anterior and posterior; DDD- degenerative disc disease ; DJD- degenerative joint disease

detailed list of potential conditions, those marked with a checkmark in Table 2 are those that were suspected or rendered as CI/diagnoses in this patient population. The majority of conditions templated were in fact diagnosed and those without a check mark were those conditions not encountered. There were some conditions seen that were not templated individually (captured as “other”), which may serve to inform similar future studies done by other institutions or CMCC.

Table 3 provides a summary of data related to region of complaint, CI/diagnoses rendered, manual therapy and referrals. Spinal chief complaints, being the majority of

the presenting complaints, are further split into cervical, thoracic and lumbar complaints, and the data is categorized between mechanical and non-mechanical conditions. The majority of patients were treated with manual therapy. Approximately 6.4% of patients either required referral for urgent care or further investigation or were sent to a local World Spine Care clinic.⁶

As described in the Outreach Program Clinical Processes section above, patients were screened for various comorbidities and problems with their health, as well as an awareness of a history of certain viral infections, all of which were self-reported. This data is provided in Table

Table 3.

Summary of region of complaint, clinical impression/diagnoses rendered, manual therapy and referrals.

Chief complaint		Total	Spine	Extremity	Other/whole body
	N	1120 [#]	804	276	40
%		71.79	24.64	3.57	
Chief complaint – spine		Total	C Spine	T Spine	L Spine
	N	804	265	122	417
%		32.96	15.17	51.87	
Both chief and secondary complaints combined – spine		Total	Mechanical	Non-mechanical	Both
Cervical spine	N	325	297	16	12
	%		91.38	4.92	3.69
Thoracic spine	N	251	237	8	6
	%		94.42	3.19	2.39
Lumbar spine	N	527	481	46	0
	%		91.27	8.73	0
	N	Yes	No	%	
Manual therapy rendered	1076*	1034	42	96.10	
	N	Yes	No	%	
Referral to urgent care	1122	20	1102	1.78	
Referral for further investigation	1122	46	1076	4.10	
Referral to World Spine Care clinic	1122	6	1116	0.53	

N = Number of Values Captured
 Other refers to non-MSK related complaints
[#] 2 missing data points
^{*} 46 missing data points

4. In particular, the most commonly reported comorbidities were hypertension, arthritis, stomach problems and diabetes. Furthermore, a majority of patients self-reported that they had previously been infected with chikungunya.

Discussion

According to Sykes⁷, there are few published studies which report empirical evidence of the activities and outcomes of short-term medical service trips. Stone⁸ reports that articles that write about short term medical service trips are often anecdotal, narrative, or focused solely on the quantity of services offered. Although outreaches have occurred with various chiropractic educational institutions for many years, there has not been a detailed account in the peer reviewed literature as to empirical findings on these short-term outreach trips. Consequently, this study's findings intend to narrow this gap.

This retrospective chart review details the MSK con-

ditions that presented, treatments rendered, and referrals made during CMCC's 2017 outreach trip. In order to be able to report on these findings, a robust templated patient intake form was used throughout the trip. Of the MSK cases that presented, the majority involved the spine and, of those, over 91% were mechanical in nature. Most patients seen on the outreach were treated on location with manual therapy (manipulation/mobilizations and or soft tissue therapy) and, where appropriate, the provision of exercises and advice.

While the empirical evidence collected showed that most presenting conditions were of a mechanical nature, non-mechanical conditions, whether presenting as a complaint or as a concomitant finding, included suspected or known tumors, neurodegenerative diseases, viscerosomatic referrals, spondyloarthropathies, fractures and leg wounds. Some unusual cases were encountered among the patients seen. These included club foot in a 5-year-old

Table 4.
Summary of screened self-reported comorbidities and problems with health.

	N	Yes	No	%
Diabetes/problems with sugar	1121	177	944	15.79
Hypertension	1121	457	664	40.77
Problems with thyroid	1121	70	1051	6.24
History of cancer	1121	10	1111	0.89
Arthritis	1121	316	805	28.19
Osteoporosis	1121	104	1017	9.28
Heart Problems	1121	114	1007	10.17
Asthma	1121	48	1073	4.28
Pulmonary problem	1121	69	1052	6.16
Stomach problems	1121	270	851	24.09
Depression	1121	115	1006	10.26
Dengue	1042	63	979	6.05
Chikungunya	1042	654	388	62.76
Zika	1042	105	937	10.08

N = Number of Values Captured (values below N=1122 reflect missing data points)

child, a suspected diabetic toe ulcer, a suspected venous leg ulcer in accordance with the CEAP classification system that this author has experience using^{9,10}, a post-fracture pin that was distinctly protruding from the arm of a patient, and a left 3rd metacarpal osteoblastoma sent to surgery at no cost to a twelve-year old patient.

Diabetes and hypertension were two of the most common comorbidities that patients self-reported. Anecdotally, some patients admitted to not taking prescribed medications consistently. The International Diabetes Federation (IDF) highlights the extent to which the poor are affected by diabetes within low and middle-income countries and have less access to diabetes medications such as metformin and insulin.¹¹ According to Dethlefs *et al.*¹² complications of diabetes and hypertension, such as ischemic heart disease and cerebrovascular disease, together with diabetes account for 57.7% of premature deaths in the DR. The multidisciplinary nature of this outreach meant that those people whose non-MSK conditions such as diabetes and hypertension were of concern, including visible complications, could easily consult with the medical doctor or nurse that was part of the team.

Another self-reported data point in this study population was in relation to previous infection with the chikungunya virus, which is an arthropod-borne alphavirus primarily transmitted by *Aedes* mosquitoes that are endemic in the Americas.¹³ In 2014 there was an outbreak in the Dominican Republic.¹⁴ Chikungunya is known to have a high symptomatic attack rate among infected people, with 50%–97% developing clinical disease with fever and polyarthralgia.¹³ Goupil and Mores¹⁵ have reported that the arthralgia that can develop from this virus can be severe and chronic, lasting months to years. Some of the patients that were seen during this outreach reported to us that they believed their current joint pains originated from this prior infection. Future studies could look at the longevity of suffering of those previously infected with the virus.

Although short-term medical trips have been criticized in the literature as providing care that is unsustainable, self-serving, burden imposing, inappropriate, and ineffective¹⁶, this outreach team recognized these issues and sought to help mitigate them, to an extent, by working with local health care resources. This occurred through the involvement of the local medical doctor, nurse and medical students during the trip for immediate care. Their involvement was also used for referrals to the local health

care system primarily to facilitate further appropriate medical care.

This study demonstrates the procedures undertaken during this CMCC outreach to the DR providing free chiropractic care to underserved communities, predetermined to be in need by a local medical doctor. It can inform other groups planning such trips with regards to the types of conditions that might be encountered and the benefits of coordination with local medical practitioners. Together with the description of the methods used to capture data, this may serve to assist such groups in planning for their outreaches and potential future studies.

Future studies could additionally plan a follow-up with patients, where possible, to assess how they feel post outreach and to gather information on whether advice and exercise therapy given on the outreach was being followed.

Limitations

A limitation of the study is that a double entry method was not used for the data entry but rather the data input was checked by one of the outreach doctors. This could have led to errors in data entry.

There are many limitations in gathering data such as this. There were many different notetakers who attempted to see a large number of people in a short period of time whilst adhering to standard protocols. This could lead to inaccuracies in data capture. The need for and use of translators also introduces an additional risk of data inaccuracy.

All of the diagnoses rendered were clinical impressions or suspected diagnoses based on a hands-on physical exam performed to the interns' best ability considering the available conditions of the outreach. In addition, simple radiographs that accompanied some patients were sometimes of poor quality, and any reports provided were written in Spanish which also impacted the accuracy of the diagnoses made.

A further limitation is that the study relied on self-reporting of comorbidities and infectious disease history, which may be unreliable since this predominantly socio-economically disadvantaged population may not have had access to accurate diagnostic testing or have even been seen by a medical professional. Intake form volunteers may also not have asked or recorded questions appropriately.

Conclusion

Conditions seen on this 2017 CMCC outreach, which visited multiple communities over 11 days across the northwest region of the DR, included those that were considered mechanical and non-mechanical. Mechanical pain accounted for 95.07% of all cervical, 96.81% of thoracic and 91.27% of lumbar spine diagnoses. Manual therapy was performed in 96.10% of cases. Twenty referrals were made to local urgent care, six to a World Spine Care clinic within the country and 46 for further investigation, including local medical doctors or surgery.

The outreach provided otherwise unattainable chiropractic care in various underserved communities for musculoskeletal complaints and connected patients back into their health care system where necessary and possible.

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